Space Weather Forecast

Issued on Sunday, 24 September 2023 at 13:17 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Isolated Moderate flares likely, with a slight chance of Strong flares (R1-R3 Radio blackouts). Chance of G1-G2 minor/moderate geomagnetic storms, most likely Day 1 (24 Sep).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with two Moderate-class flares observed in the past 24hrs, the largest peaking at 24/0328 UTC from a sunspot region in the southeast. Frequent Common-class flares were also observed. There are a total of ten sunspot regions on the disc. The sunspot region responsible for the largest flare mentioned above is also the most active and complex region on the disc. Other regions on the disc have persisted as moderately sized, most notably in the northwest and north-centre locations, and have continued to show come complexity. Another notable region in the west has previously shown some activity, but has seen a recent decrease in both complexity and size.

A Coronal Mass Ejection (CME) has been observed from over the northwest limb, but is unlikely to be Earth-directed, pending further analysis. No other Earth-directed CMEs have been observed in the past 24hrs.

Solar Wind / Geomagnetic Activity: Slow wind conditions persisted with observed solar wind speeds at background speeds, initially around 360km/s but have since dropped further to around 310km/s. The Interplanetary magnetic field strength (IMF) was weak, with the north-south component also weak but predominately negative (southward). Resultant geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no Solar Radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Forecast to persist at Moderate with further isolated Moderate flares likely. There is also a slight chance of rising to High due to the potential for isolated Strong flares from the sunspot region in the southeast.

Solar Wind / Geomagnetic Activity: CME arrivals are possible through much of the period, with the most significant from the long lasting Moderate flare early on 22 Sep, likely arriving Day 1 (24 Sep). Confidence is low however, with a glancing impact most likely. There are also other possible weaker glancing impacts. This includes the CMEs from the Moderate flares on 20 Sep (perhaps glancing early Day 1) and 21 Sep (perhaps glancing later Day 1 or Day 2, 24-25 Sep). These may all combine to a single arrival however. Beyond this, there are a couple of further weak arrivals possible, from weak CMEs observed on 22 Sep. These have a chance of arriving giving a combined but glancing arrival on Day 2 and into Day 3 (25-26 Sep), however this is very low confidence. In the absence of any CME arrivals, mainly slow background winds are

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expected to persist. Geomagnetic activity is expected to be Quiet to Unsettled at first, but likely increasing to Active to G1 Minor Storm, with a chance of G2 Minor Storm intervals, with any CME arrivals, most likely Day 1 (24 Sep), with a lower chance Day 2-3 (25-26 Sep). This brings a low chance of visible aurora to northern parts of the UK, mainly Days 1-2 (24-25 Sep).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background with no Solar Radiation storms occurring.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	30	20	5
Strong	G3	No	10	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	60	60
Very Active	R3 to R5 X	No	20	20	15	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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